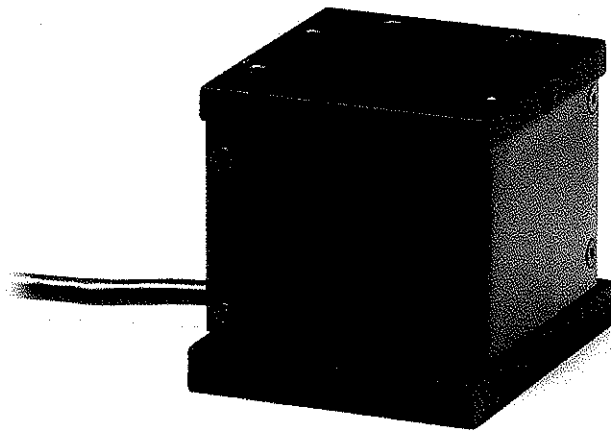


ES-50

Series



Elevation Stage Reference Manual

(Open and Closed Loop Versions)

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www.micosusa.com

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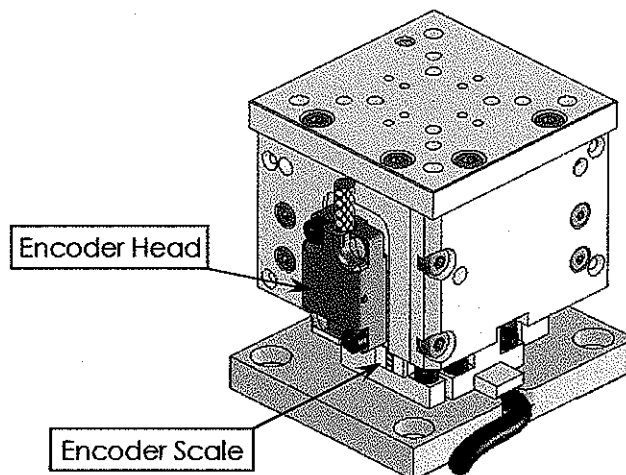
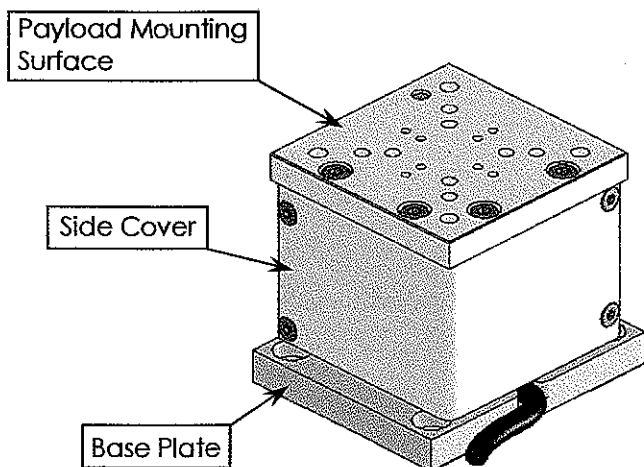
1. Introduction

1.1 Product Description

The ES-50 is a compact elevation stage designed for limited space applications. Two steel pre-loaded ball bearings allow for loads up to 1 Kg while providing high rigidity and smooth travel up to 10 mm. An optional linear encoder provides the user with sub-micron repeatability. The ES-50 can also be combined with the VT-21 and VT-50 series of linear stages for custom applications.

Features:

- Travel range of 10 mm
- Load capacity up to 1kg
- Integrated mechanical limit switches
- Optional linear encoder with 50 nm resolution



1.2 Recommended Controllers

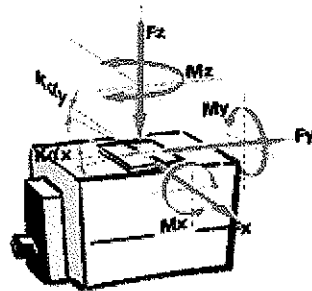
The following controllers are available from Micos USA:

- SMC pollux
- SMC corvus eco
- SMC pci

1.3 Technical Data

Motor	2 Phase-018
Pitch (mm)	0.5
Speed Max. (mm/sec)	5
Resolution Typical (μm)	0.1
Bi-directional Repeatability (μm)	± 2 (Open Loop); ± 0.1 (Closed Loop)
Uni-directional Repeatability (μm)	± 1 (Open Loop); ± 0.1 (Closed Loop)

1.4 Load Characteristics



Load Characteristics	$F_x(\text{N})$	$F_y(\text{N})$	$F_z(\text{N})$	$M_x(\text{Nm})$	$M_y(\text{Nm})$	$M_z(\text{Nm})$
2 Phase-018	5	5	10	1	1	1

2. Model Configurations

2.1 ES-50 Order Numbers

Order No.		6606-9-						
2Phase-018.....	2							
10 mm.....	2							
Open Loop.....	0							
Linear Encoder, 50nm*.....	1							
Mechanical Limits.....	2							
Pitch 0.5 mm.....	1							
Non-vacuum.....	0							
Vacuum prepared, 10 ⁻⁶ mbar.....	1							

* Other resolutions available upon request.

Contact Micos USA for custom applications and stacking configurations.

3. Preparing to Install the ES-50

3.1 Installation Preparation

When mounting the stage it is important to consider the flatness of the mounting surface, as the stage will conform to the shape of that mounting surface. A surface that is not flat can adversely affect the performance and structural integrity of the stage.

The stage is calibrated and guaranteed to be within specification at 20°C ±5°C. Be sure to use the stage under the following conditions:

- Mount to a clean and flat surface which is free of debris, burrs or dings
- An indoor atmosphere free of corrosive gasses, and condensation
- Temperature range of 0-40°C
- Relative humidity between 20-80%
- Locate away from water, heat, and electrical noise

3.2 Package Contents

If product is damaged or there are missing components, contact Micos USA immediately. Do not discard product packaging in case of return shipment.

Package Should Contain:

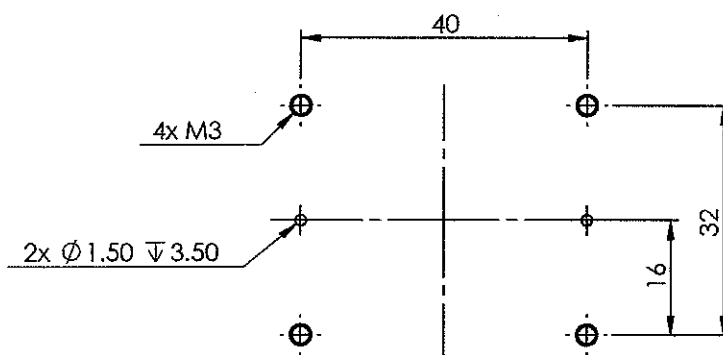
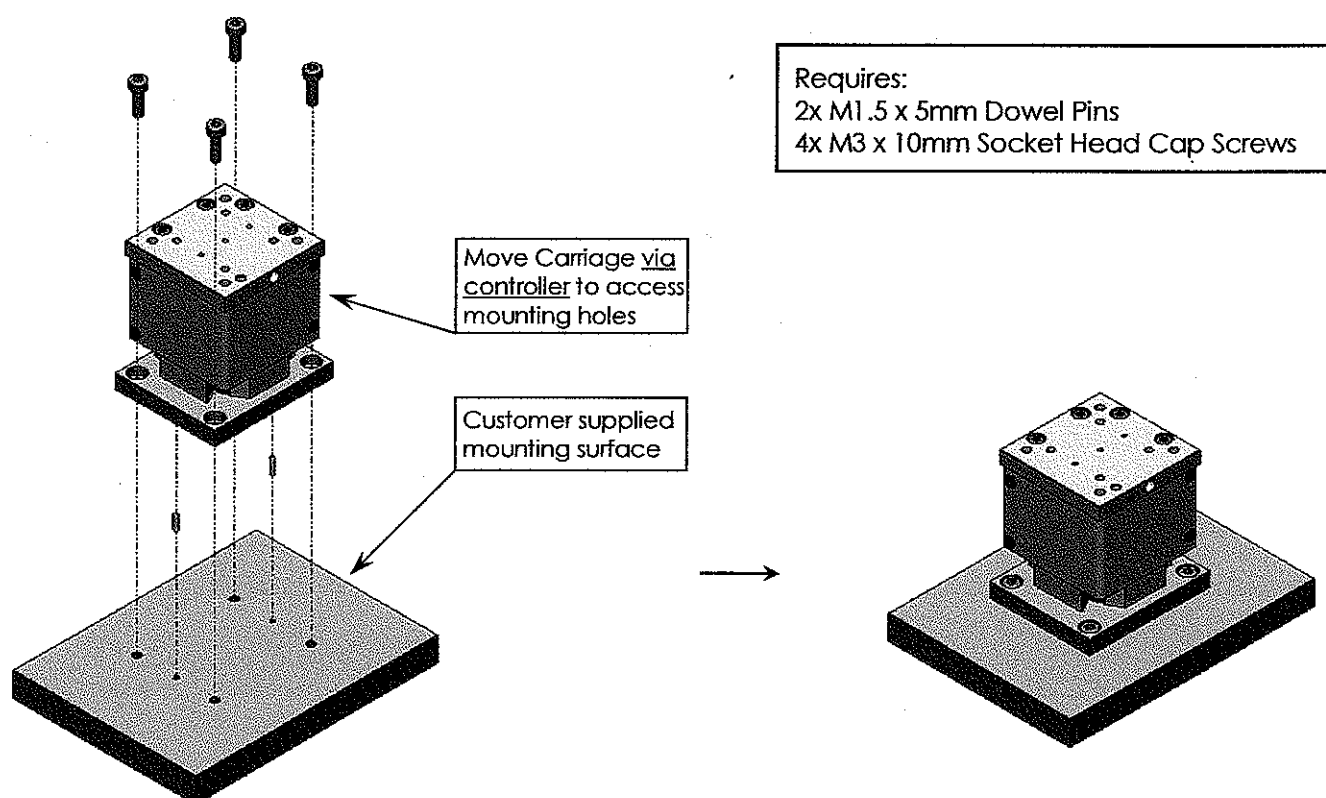
- ES-50 Elevation Stage
- 15 to 9 pin Dsub Connector Cable (closed loop only)
- Reference Manual
- Any other previously agreed upon components such as a controller and cable

4. Installing the ES-50

4.1 ES-50 10mm Installation

4.1.1 Base Mounting

Base Mounting requires M3 socket head cap screws for mounting and M1.5 x 5mm dowel pins for precision alignment. It may be necessary to move the carriage via the controller in order to access the base mounting holes. Additional brackets may be needed for custom applications.



Base Mounting Pattern

5. Connecting the ES-50

5.1 Atmospheric Environments

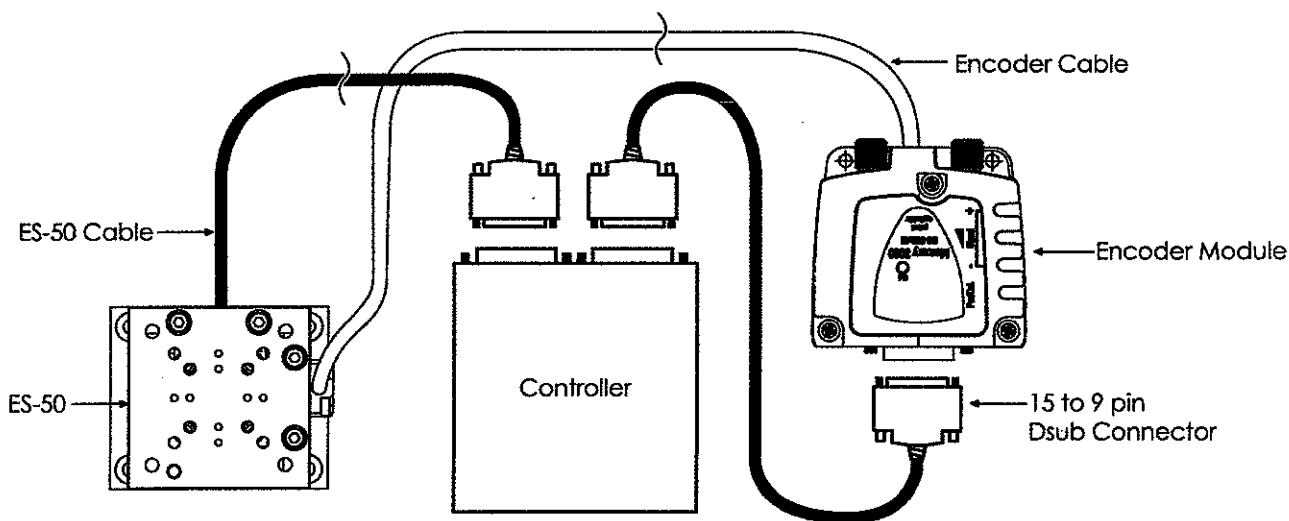
The ES-50 is black anodized for atmospheric environments. This allows for a harder surface finish and greater durability over the life of the stage.

5.1.1 Open Loop Installation

Connecting the ES-50 in an open loop only requires that the motor cable be connected to a compatible controller. No other cables or components are needed.

5.1.2 Closed Loop Installation & Wiring Diagram

Using the ES-50 stage with an encoder requires a closed loop compatible controller that recognizes encoder feedback. Connect the stage as shown below using the supplied 15 to 9 pin cable to connect the Encoder Module to the Controller.



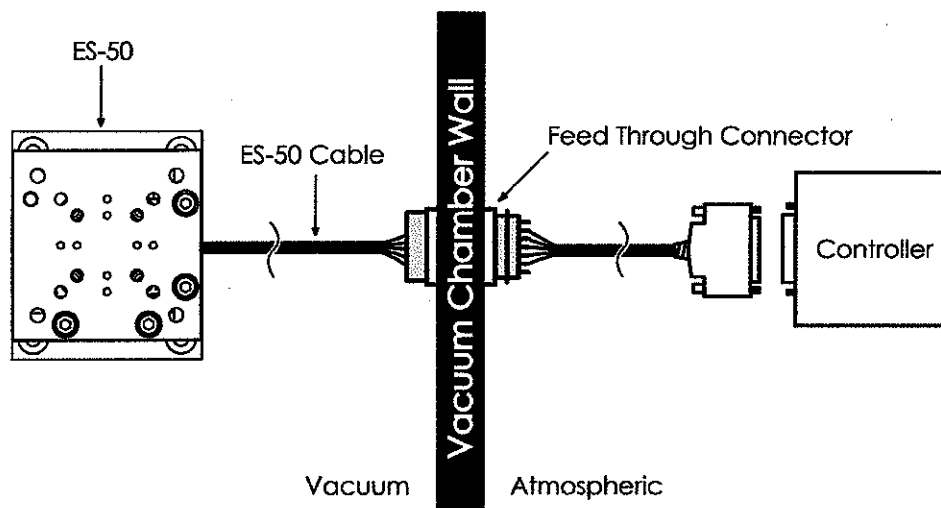
5.2 Vacuum Environments

5.2.1 Handling and Preparation

The vacuum version of the ES-50 is non-anodized and prepared for use in vacuum environments. Take the necessary precautions (such as wearing gloves, clean room clothing, etc.) when handling the stage as to avoid any contaminants. The connectors that ship with the stage are for testing use only and should be replaced with permanent connectors prior to installation.

5.2.2 Open loop Installation & Wiring Diagram

Connecting the ES-50 in an open loop requires the use of a feed through connector at the vacuum chamber wall. Match wire colors when passing the ES-50 motor cable through the feed through connector.

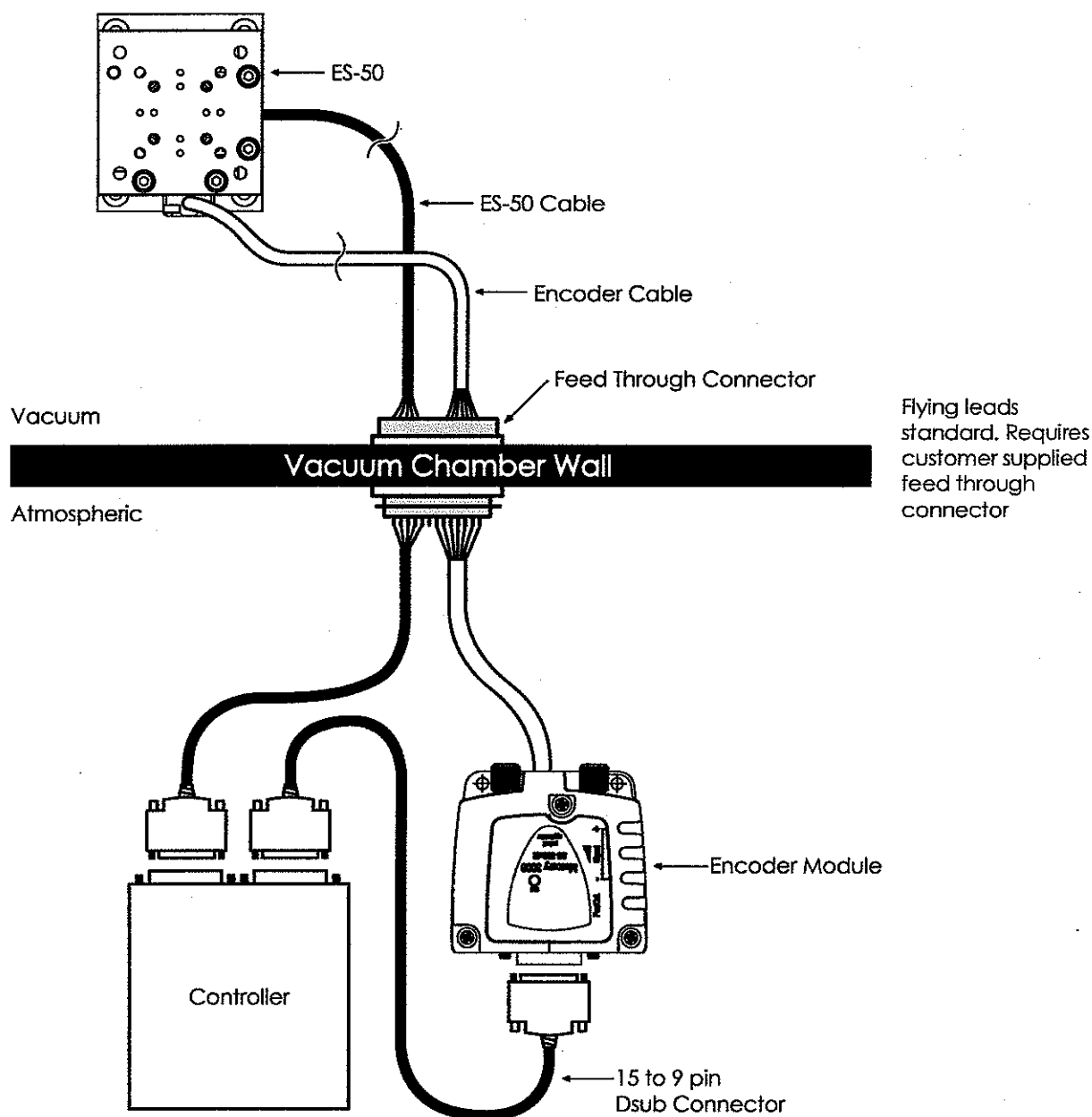


Flying leads standard.
Requires customer supplied
feed through connector

5.2.3 Closed Loop/Encoder Installation & Wiring Diagram

Closed loop installation of the ES-50 stage in vacuum environments requires an intermediate feed through connector at the vacuum chamber wall that can accommodate both the motor cable, and the encoder cable.

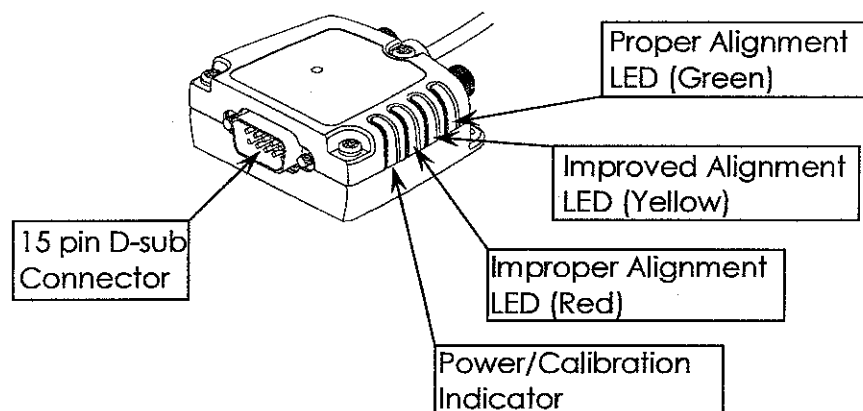
Important: Match wire colors when connecting the Encoder Head (vacuum side) to the Encoder Module (atmospheric side). Also, connect the shield of the Encoder Head to the shield of the Encoder Module through the feed through connector.



5.3 Using the Encoder Module

When connected in a closed loop, the Encoder Module should display two green LED's indicating a power source and proper encoder alignment. A Red or Yellow LED indicates misalignment of the Encoder Head, if this occurs contact Micos USA. Do not manually adjust the Encoder Head or scale. For more information refer to MicroE Systems Mercury Encoders.

5.3.1 Encoder Module Overview



5.3.2 Encoder Module Pinout

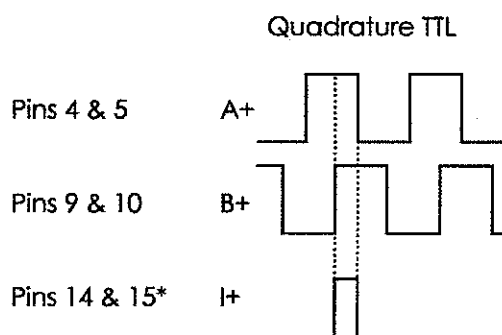
Pin	Description	Pin	Description
1	Ground*	9	B-
2	Transmit**	10	B+
3	Receive**	11	Alarm**
4	A-	12	+5V
5	A+	13	Ground
6	Reserved	14	Index +
7	Reserved	15	Index -
8	Reserved		

*Note: The ground connection should be made to pin 13 in the mating connector.

**Note: Proprietary pins reserved for MicroE, not required to be connected to controller.

5.3.3 Operating and Electrical Specifications

Power Supply	5VDC \pm 5% @ 330mA (30mA for sensor)
Operating Temperature	0 to 70°C
Humidity	10 - 90% RH non-condensing















5.3.4 Output Signals

*Note: The index pulse may be aligned with A- or B- at some interpolation values.

6. General Technical Specifications

6.1 Electrical Connections

6.1.1 Motor Pinout & Cable

Pin	Wire Color		Description
	Non-Vacuum	Vacuum Prepared	
1	 Green	 Green	Motor Phase A+
2	 Green/White	 Blue	Motor Phase A-
3	 Red/White	 Black	Motor Phase B+
4	 Red	 Red	Motor Phase B-
5	 Brown	 Brown	Limit Switch Common
6	 White	 White	Limit Switch – (near base)
7	 Purple	 Purple	Limit Switch + (away from base)
8	Not used		Not Used
9	Not used		Not Used

Limit Switch Common (pin 5) is connected to ground in MICOS controllers

6.1.2 Stepper Motor

Motor Type	2 Phase Bipolar
Phase Current	0.24 A max.
Step Angle	1.8 °
Steps	200
Coil-Resistance	20.4 Ohms
Coil-Inductance	5 mH
Pitch	0.5 mm/rev
Resolution/Fullstep	2.5 μm

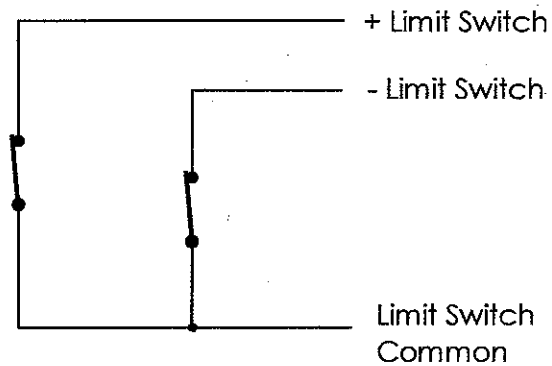
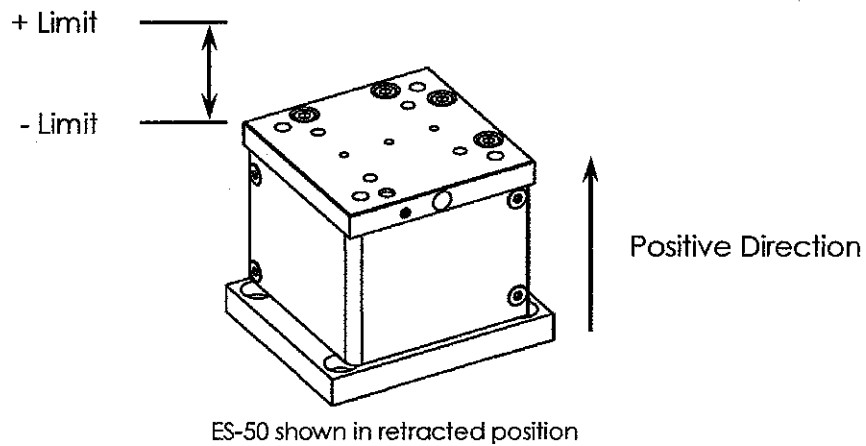
6.2 Limit Switches

The limit switches are normally closed (when not activated) and should be connected to a compatible controller that recognizes these settings. Failure to properly set up the limit switches in the controller will result in physical damage to the switches themselves. A hard stop is designed into the ES-50 body which will prevent the carriage from running away should the limit switches fail.

The limit switches are factory calibrated to ensure advertised travel length, and cannot be adjusted by the customer. For custom travel lengths, please contact Micos USA.

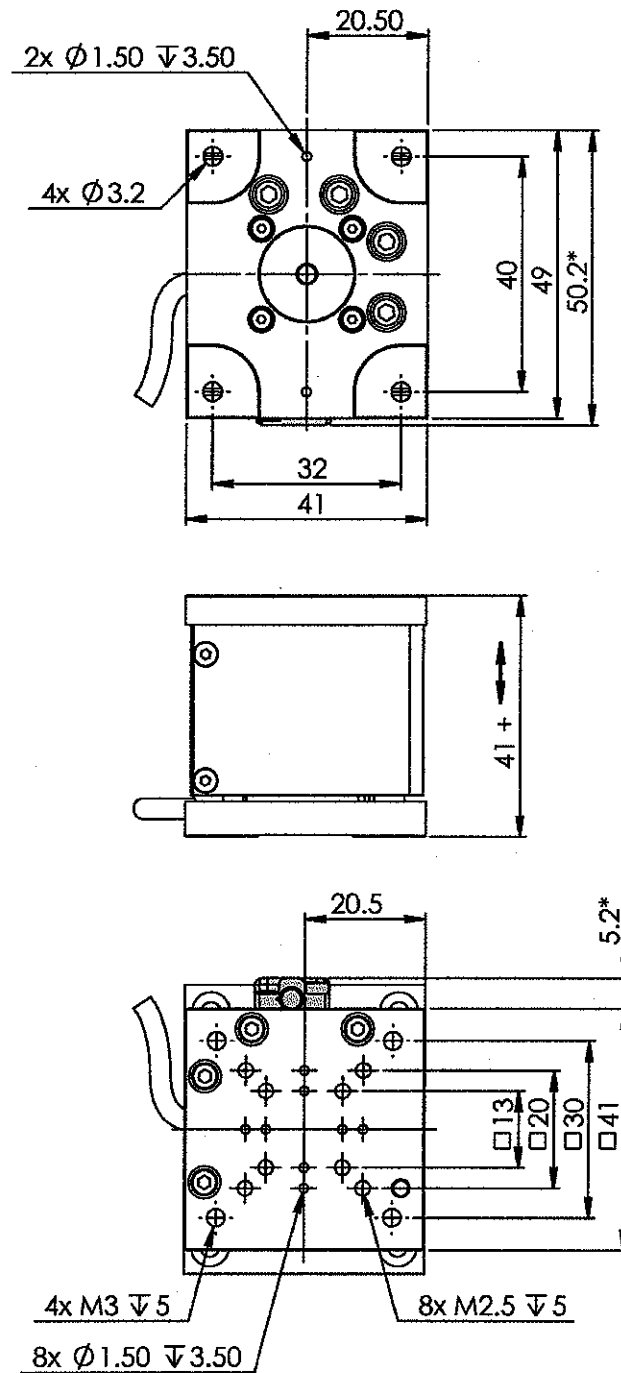
6.2.1 Mechanical Limit Switches

Contact Rating	100 mA @ 30 V
Contact Type	Normally Closed
Operating Temperature	-25 to +70 °C

6.2.2 Limit Switch Schematic**6.2.3 Direction of Motion**

6.3 Dimensions

6.3.1 ES-50 10mm

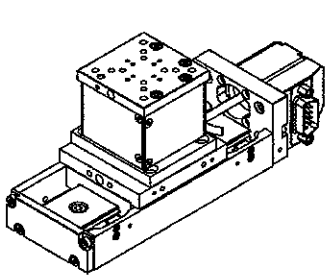


*Grey parts for closed loop version only

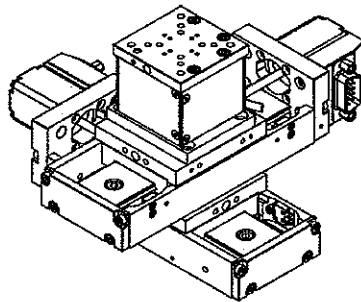
7. Stacking Configurations

7.1 Possible Configurations

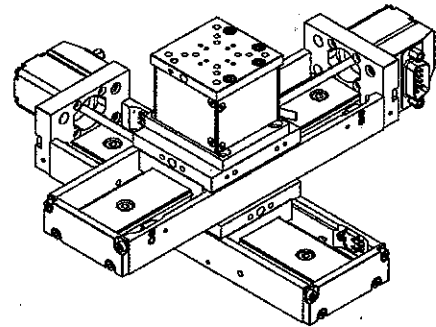
Using the ES-50 Elevation Stage and VT-50 Linear Stage



X-Z 55x10 mm

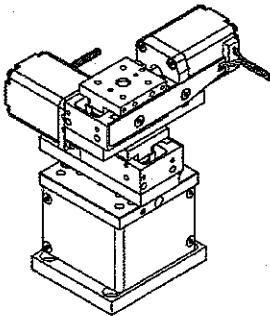


X-Y-Z 55x55x10 mm

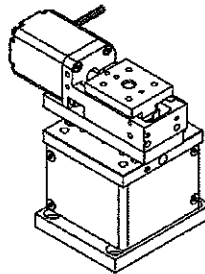


X-Y-Z 100x100x10 mm

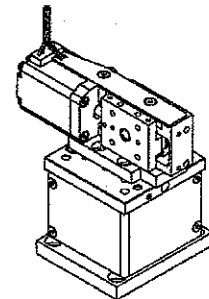
Using the ES-50 Elevation Stage and VT-21 Linear Stage



Z-X-Y 10x10x10 mm



Z-X 10x10 mm



Z-X (side) 10x10 mm